Five new grasshoppers from Africa with notes on the genera *Auloserpusia* Rehn, 1914 and *Lobopoma* Karsch, 1896

(Orth. Acrididae)

BY

N. D. JAGO.

Ghana.

INTRODUCTION.

While the genus *Serpusia* Karsch, 1891 shows great sexual dimorphism in size, the genus *Auloserpusia,* to which it is related, also displays conspicuous sexual dimorphism in colour. The males are much smaller than the females in both genera. In *A. chopardi* Dirsh and *A. potamites* sp. n. the female is generally uniform green in colour on the body, the males brightly coloured with green and yellow-ochre markings. The females are very inconspicuous in the natural habitat. In contrast, *A. malasmanota* sp. nov. and *A. charadrophila* sp. nov. have rather uniformly coloured males and brightly coloured females. *A. ochrobalia* sp. nov. shows intermediate colour facies between these two main groups, the males having a pattern akin to that in *A. chopardi* Dirsh, but in shades of brown, and the females being similar to those of *A. charadrophila* sp. nov. The nymphs of *A. potamites* sp. nov. are of interest:

(a) they have a relatively smooth pronotum like that found in *A. ochrobalia* sp. nov. and *A. charadrophila* sp. nov. (see figs. 15 and 19 respectively).
(b) the female nymphs are rather similar in colour to the adult females of *A. charadrophila* sp. nov. (fig. 9).

This is suggestive of a secondary development of the adult rugosity and brighter colouring in *A. chopardi* Dirsh and *A. potamites* sp. nov. from the *A. ochrobalia* type.

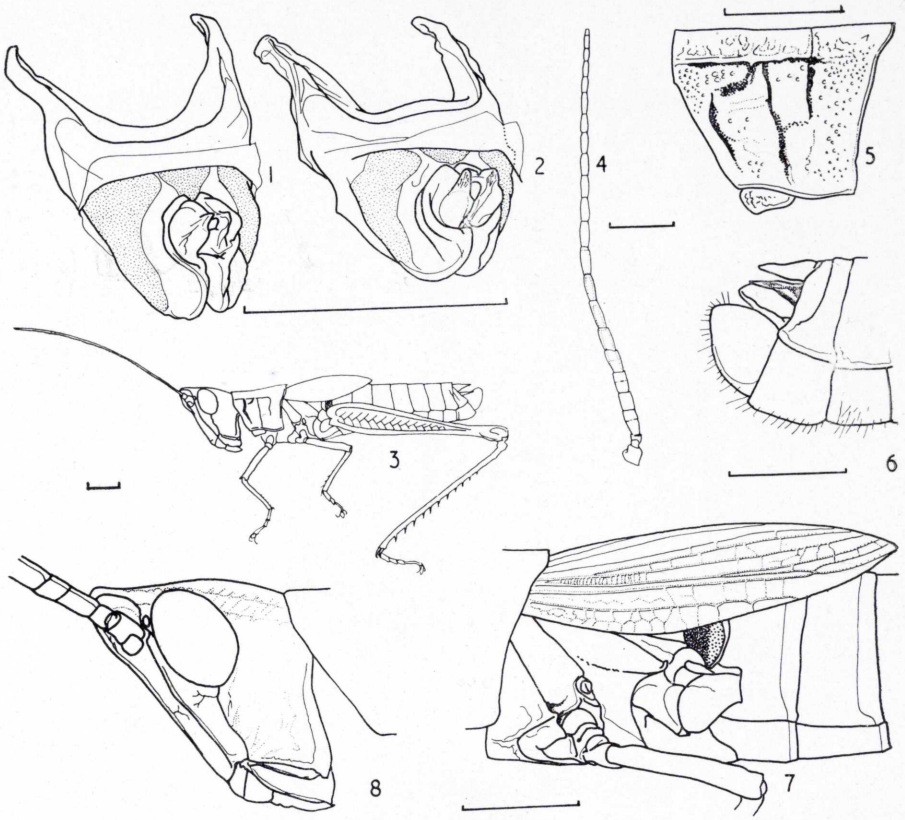
In the genus *Apoboleus* Karsch, 1891 in West Africa the species

with little colour sexual dimorphism are largely brown ground-dwelling species which actively ascend the vegetation only at night. *Apoboleus sylvaticus* Chapman, however, parallels the genus *Auloserpusia* in having a relatively brightly coloured male and female, with different body colouration in each sex (see Chapman, 1961). In this case, however, the species is seen to live among the vegetation on which it feeds, and not be so strictly addicted to the forest floor. These colour patterns in the sexually dimorphic forms seem therefore to be a camouflage mechanism designed to match the contrasting backgrounds of the forest floor on the one hand, and green ferns or wet forest vegetation on the other. In the genus *Auloserpusia* the species are foliage inhabiting, and all have the differential colouring of the sexes developed to a greater or lesser degree, the most startling male colour patterns having probably evolved from the uniformly coloured type.

The new species of *Auloserpusia* are also of great interest because the females of each species are as divergent from one another in their colouration as are the males. In many grasshopper genera the males show great divergence, females often being almost indistinguishable. In *Auloserpusia* this trend may have been broken both (a) because of the loss of a well developed stridulatory device in the male requiring visual recognition patterns, and (b) because of the low light intensity of the natural forest habitat. Both the above could lead to females developing easily recognisable colour patterns, the sexes being attracted at relatively close range by visual stimuli, possibly augmented by mandibular stridulation.

In contrast the genus *Lobopoma* is one whose member species inhabit savannah. The genus previously contained two species, *L. ambages* Karsch from East Africa, and *L. longicornis* Chopard from Mont Nimba in the Guinea Republic. The closely related genus *Pamacris* Ramme, 1929 has a male vertex very like that in the genus *Lobopoma,* but the males by constrast are all long-winged. Moreover, the lateral carinae remain distinct posteriorly instead of fading as they do in *Lobopoma.* The generic limits seem however to be vague, *L. longicornis* Chopard being close to *P. diversipennis* Ramme, 1929. It is clear that *L. longicornis, L. carterocera* sp. n., and *P. diversipennis* are much closer to each other morphologically than they are to *L. ambages* in East Africa, in spite of the fact that geographically *carterocera* and *ambages* are nearer to each other. The new species is therefore described under *Lobopoma* Karsch.

As regards the distribution of the above new species, it is of great interest that the genus *Lobopoma* once again demonstrates that intermediate species occur which link the fauna of East Africa and that of isolated montane or upland grassland species in West Africa. *Pamacris* was already known from Cameroons, the new species adding a generic link in the southern Sudan.



Figs. 1-8.—Male phallic complex of *Auloserpusia* spp. from left posterolateral aspect, 1. *A. chopardi* Dirsh, 2. *A. potamites* sp. nov.; 3-8. *Lobopoma carterocera* sp. nov., 3. male from left side (semi-diagrammatic), 4. right antenna seen from above, 5. left side of male pronotum, 6. right side of male abdominal apex, 7. left side of male thorax, 8. left side of male head. All scale lines represent 2 mm.

Auloserpusia has given the misleading impression that it was poorly represented in West Africa, with *A. chopardi* Dirsh being the only species so far recorded west of the river Niger. The 8 apparently valid species recorded east of Nigeria are mainly known from the mountainous Lakes region of former Belgian Congo. The new West African species

help to balance the picture, as well as indicating the need for increased biological investigation of the submontane forest faunas of the hills of Northern Liberia, Central Guinea, and North West Ivory Coast. Many more links with Central Africa will without doubt emerge, especially among the *Tettigonioidea* (Orthoptera) (see map. 1, p. 218).

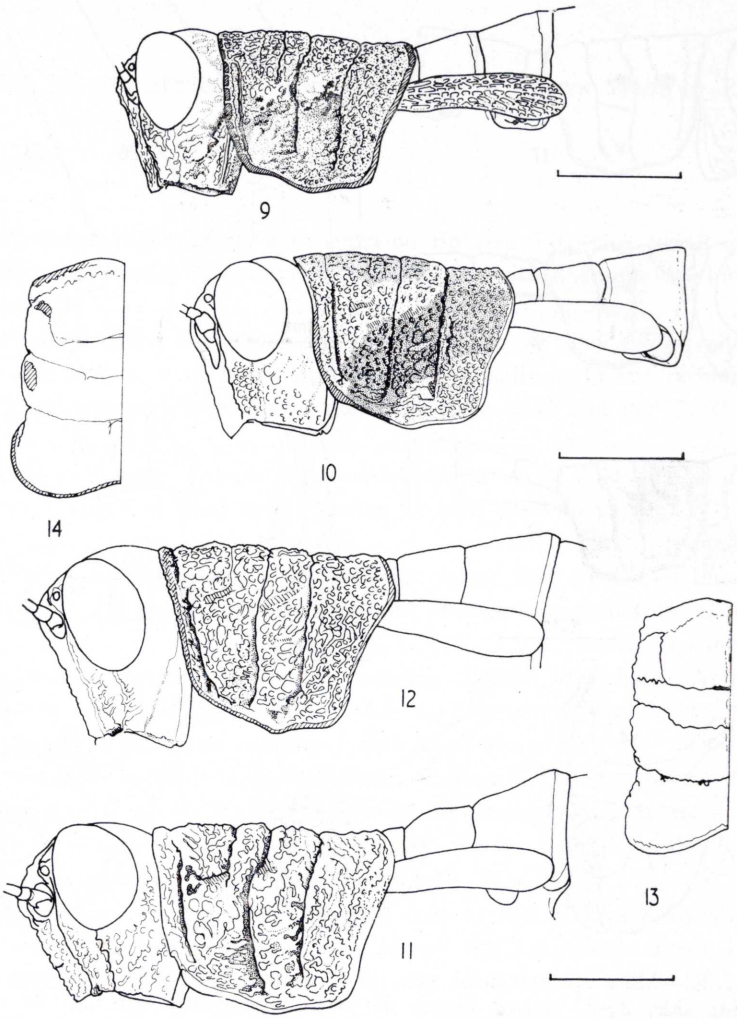
KEY TO THE SPECIES OF AULOSERPUSIA NOW KNOWN WEST OF R. NIGER.

Males.

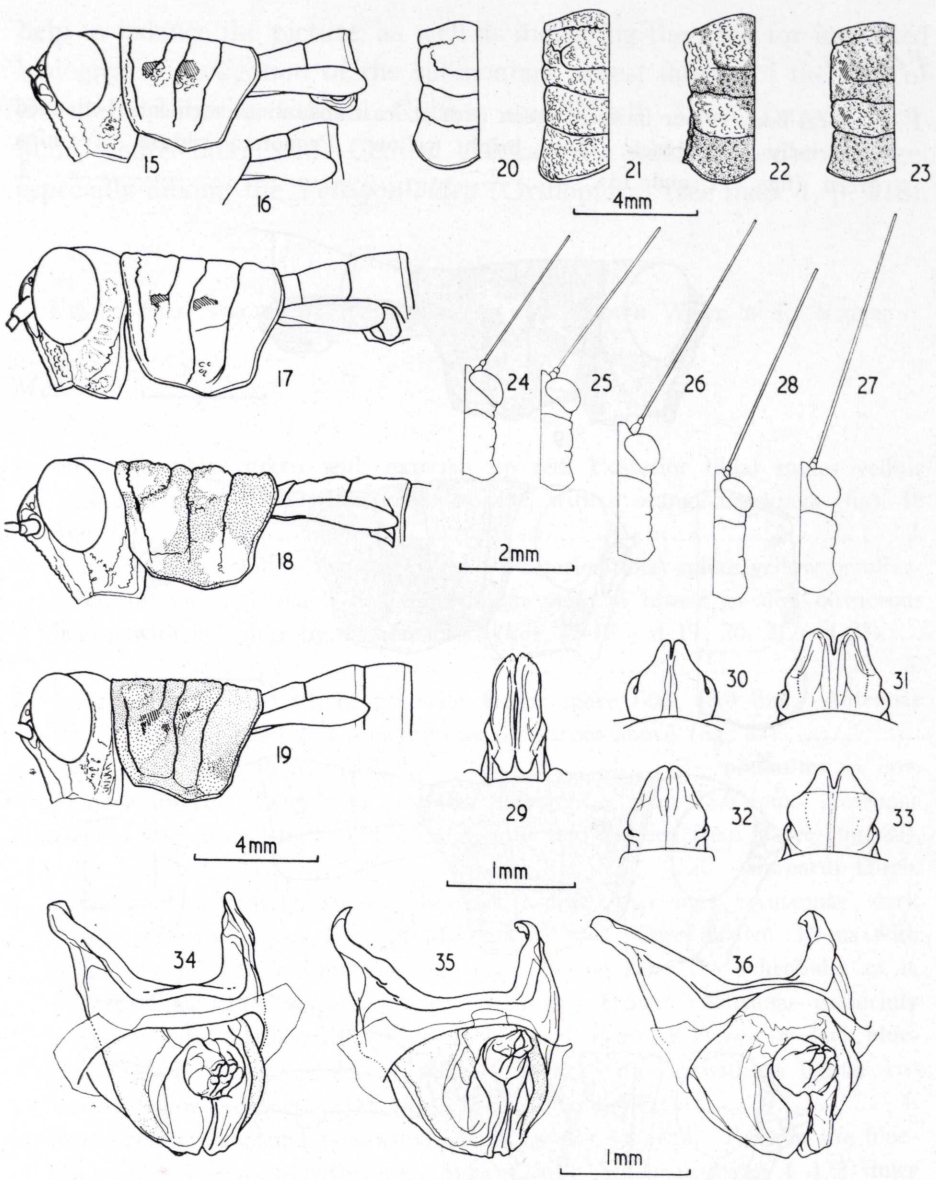
1. Posterior tibiae green with extreme tip red. Posterior tibial spines yellow with black tips. Pronotum green, rugose, with 8 orange markings (figs. 18 and 22). ..... 2.
— Posterior tibiae dull olivaceous brown. Posterior tibial spines yellow or olivaceous brown, with black tips. Pronotum uniform brown or dull olivaceous brown with indefinite lighter markings (figs. 15-17 and 19; 20, 21 and 23). ... . 3.
2. Larger insects. Length of posterior femur more than 13.0 mm. Antennae twice length of head and pronotum as seen from above (fig. 27). .... **potamites** sp. nov.
— Smaller insects. Length of posterior femur less than 13.0 mm. Antennae about 1 2/3 times length of head and pronotum as seen from above (fig. 25). ..... **chopardi** Dirsh.
3. Pronotum moderately rugose, bearing lighter markings. Antennae dark brown with pale tips. Eyes in life dark brown. Cerci brown. Frons with 2 lighter areas below compound eyes (figs. 19 and 23). ... **ochrobalia** sp. n.
— Pronotum smoothly rounded above; uniformly brown. Antennae uniformly brown or basal 3/5 blackish. Eyes in life dark greenish brown or dark blue-black. Cerci orange-brown or yellow. Frons with or without lighter colouring below compound eyes (figs. 15-17, 20 and 21). ..... 4.
4. Frons below compound eyes same colour as rest of head. Eyes in life blue-black. Cerci orange-brown with brown tips. Antennae about 1 1/2 times length of head and pronotum as seen from above (fig. 24). .... **charadrophila** sp. nov.
— Frons below compound eyes a conspicuous ochre colour contrasting with dull olivaceous colour of rest of head. Eyes in life dark greenish brown. Cerci yellow. Antennae about 1 3/4 times length of head and pronotus as seem from above (fig. 26). ..... **malasmanota** sp. nov

Females.

1. General body colour uniform green with at least abdominal segments 1-4 edged posteriorly with black. Cerci bright yellow. Pronotum rugose. Tegmina green (figs. 11 and 13). ..... 2.



Figs. 9-14.—Pronota of female *Auloserpusia* spp., 9-12 in lateral aspect from left side; 13 and 14 from above showing left side; 9. *A. charadrophila* sp. nov., 10. *A. malasmanota* sp. nov., 11. *A. potamites* sp. nov., 12. *A. ochrobalia* sp. nov., 13. *A. potamites* sp. nov., 14. *A. ochrobalia* sp. nov. All diagonal shading in figs. 9-12 which slopes from top left to bottom right represents smooth areas on dorso-lateral pronotal callosities. Marginal pronotal shading in figs. 9, 12 and 14 represents crimson colouration, that in fig. 10 being yellow. In fig. 9 unstippled areas on pronotum are yellow, while dense stipple in fig. 10 represents black or dark grey areas. All scale lines represent 4 mm.



Figs. 15-36.—Male *Auloserpusia* spp., 15-19 lateral aspect of head and pronotum from left side, 20-23 dorsal aspect of pronota showing left half in each case, 24-28 dorsal aspect of head, pronotum and right antenna, 29-33 dorsal aspect of penis apex, 34-36 penis valve — cingular ramus complex seen from a posterolateral aspect: figs. 15, 16, 20, 24, 29, 35, *A. charadrophila* sp. nov.; figs. 17, 21, 26, 30, 34, *A. malasmanota* sp. nov.; figs. 18, 22, 27, 31, *A. potamites* sp. nov.; figs. 25, 33, *A. chopardi* DIRSH; figs. 19, 23, 28, 32, 36, *A. ochrobalia* sp. nov. In figs. 15, 17-19, and 23, diagonal shading represents smooth areas on pronotal callosities. In figs. 18 and 22, unshaded areas represent orange markings; in figs. 19 and 23 dense and light stipple represents olivaceous brown and ochre areas respectively. 4 mm. scale lines apply to figs. 15-23, 2 mm. scale lines to figs. 24-28, and 1 mm. scale lines to figs. 29-36.

— Body not uniformly coloured, pronotum being edged with crimson, sometimes marked with black or yellow, and generally less rugose. Cerci yellow or brown. Tegmina red brown (figs. 9, 10, 12). ..... 3.

2. Lower inner and lower outer area of posterior femora blue-grey. Vertex rugose. Smaller insects; length of posterior femora less than 19 mm. Ratio of length of posterior femur to greatest depth about 4.6. Abdomen not greatly inflated in region of segment 1. ..... **chopardi** Dirsh.

— Lower inner and lower outer area of posterior femora uniform green. Vertex smoother. Larger insects; length of posterior femora more than 19 mm. Ratio of length of posterior femora to greatest depth about 4.9 mm. Abdomen conspicuously inflated dorsally in region of abdominal segment 1 (figs. 11, 13). ..... **potamites** sp. nov.

3. Pronotum with black markings dorsally and conspicuous black diagonal lateral bands (fig. 10). Eyes red-brown. Front border of pronotal side lobes narrowly edged with yellow. 2nd abdominal segment blackish brown; other segments dark green. Posterior femora with marked black 'herring-bone' pattern on outer area ..... **malasmanota** sp. nov.

— Pronotum without conspicuous black markings and not edged with yellow. Eyes blue-black or brown Abdomen dark green with black posterior margin to each tergite. 'Herring-bone' pattern of posterior femora not picked out in black. ..... 4.

4. Body generally dull olivaceous green. Eyes in life brown. Pronotum with suggestion of lighter olivaceous markins dorso-laterally (figs. 12 and 14). Antennae conspicuously longer than head and pronotum when viewed dorsally. ..... **ochrobalia** sp. nov.

— Body generally dark green. Eyes in life blue-black. Pronotum with conspicuous crimson margin around lateral lobes (fig. 9). Dorso-lateral part of side lobes with conspicuous yellow markings. Antennae about as long as head and pronotum as seen from above. ..... **charadrophila** sp. nov.

Description of Species.

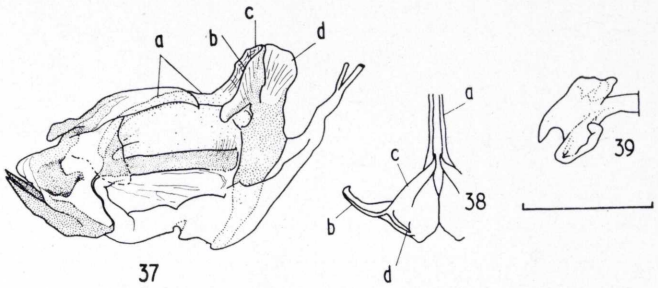
Lobopoma carterocera sp. nov.

Male.

Head generally olivaceous green, eyes light brown, frontal ridges light green; yellowish stripe in front of compound eye to back of head on either side of vertex. Genae below eyes, and narrow band in front of compound eyes towards lateral ocellus, yellowish. Labrum and mandibles green. Area under lateral lips of vertex and around lateral ocelli black. Vertex as in fig. 8. Foveolae adjacent to lateral ocelli almost obsolete.

Antennae intact but with 16 segments on left antenna, 21 on right

(left probably damaged early in development). Segments 3-7 on right antenna showing distinct flattening of dorsal surface. Segments 8-21 circular in cross section. Segments 3-7 with cross section triangular, especially in proximal segments. Flattened upper surface of segments 3-7 bordered laterally with iridescent blue. General antennal colour black basally (except segments 1 and 2 blue-green), to dark brown apically. Antennal segments 1-6 more or less smooth; segments 7 onwards matt (fig. 4). Segments 3 and 5 showing traces of fusion of two segments, and bearing transverse suture. Antennae easily as long as distance from vertex to apices of folded tegmina.



Figs. 37-39.—Phallic complex of *Lobopoma carterocera* sp. nov.; 37, phallic complex from right side with epiphallus removed; 38, flanges of basal or proximal parts of penis valves. Portions *a, b, c, d,* correspond to those on 37; 39, left side epiphallic plate. Scale line represents 1 mm.

Pronotum weakly tectiform above. Median carina developed completely. Lateral carinae disappearing behind third transverse sulcus. Disc of pronotum crossed only by 3rd transverse sulcus; colour light green. Lateral carinae yellowish, edged below with incomplete black line. Laterally pronotal lobes brownish. Sulci lined with black (fig. 5). Pronotum slightly inflated behind third transverse sulcus; anterior to this lateral pronotal carinae straight parallel. Pronotum rounded behind.

Tegmina pointed, reaching well past 3rd abdominal tergite (figs. 3, 7). Anterior to vein M brown; posterior to M light green. Hind wings reduced, colourless to greenish. Non-functional for flight.

Thorax olivaceous brown. Sutures lined narrowly in black. Fore and mid legs bright green.

Abdomen yellow — possibly greenish anteriorly in life. Cerci simple and conical; black with yellow tips. Supra-anal plate greenish. Subgenital plate and 8th sternite bright red (fig. 6). Ist and 2nd abdominal sternites bordered with black posteriorly.

Posterior femora light orange-yellow. 'Knees' black. Narrow band anterior to 'knees' greenish. Posterior tibiae light blue; blackish apically, ventrally, and near 'knee'. Spines (12 outer; 12 inner) light blue, black-tipped. Spurs greenish black-tipped. Posterior tarsi blue, segments 2 and 3 being brownish basally. Tarsal claws black-tipped. Large tarsal pads.

Epiphallus as in fig. 39; penis valves as in figs. 37, 38.

Differential Diagnosis.

1. Differs from *Pamacris diversipennis* Ramme in having lateral pronotal carinae incomplete posteriorly (complete in *Pamacris)* and in being brachypterous (wings normally developed in *Pamacris)*. Vertex of two species very similar.

2. The three known *Lobopoma* species can be easily separated by comparison of males:

	ambages	*longicornis*	*carterocera*
Antennae.	flattened up to segment 8. Length (L) shorter than distance from vertex to tegminal apices (D) ie. L< D.	hardly flattened. L = D, but tegmina shorter.	flattened to segment 7. L = D and tegmigna longer.
Lateral foveolae of vertex.	conspicuous.	none.	none.
Tegmina.	brown above, green below with median cream stripe.	olivaceous with brown veins.	green above, brown below.
Tegminal apices.	reach midway across abd. tergite 3.	reach posterior edge abd. tergite 2.	reach beyond abd. tergite 3 (figs. 3 and 7).
Colour of subgenital plate.	brown.	yellow.	red.
Colour of wings.	red.	colourless.	colourless.

	ambages	*longicornis*	*carterocera*
Colour of cerci.	brown.	black; apically red.	black; apically yellow.
Posterior femora.	light brown.	red externally. Rest dull yellow; 'knees' brown.	orange-yellow; 'knees' black.
Posterior tibiae.	light brown. Spines yellow, black-tipped.	Both with tibiae pale blue, black apically, However, spines white, black-tipped.	spines blue, black-tipped.

Female.

Female generally similar to male in all sex characters, but a larger insect. Antennae are however shorter (shorter than length from front of vertex to tips of folded tegmina). Segments 3-8 flattened with segments 3 and 6 showing transverse suture. Genae rather browner. Sides of pronotum browner; anterior sulcus crossing pronotal disc as a depression anteriorly. Tegmina green with light brown stripe along line of R_1. Posterior femora brown, but 'knees' blackish as in male. Posterior tibiae black ventrally; spines white with black tips. Subgenital plate of female red, except median tip which is greenish. Parameres cream, black above. Cerci dark brown.

Measurements.

	Male	*Female*
Head width	2·9	4·4
Length posterior femur	12·6	17·2
Frons to tegminal apices	11·6	17·9
Tegminal length	5·8	6·8

Material.

Only the single male and female are known.

Holotype ♂, S. SUDAN, Equatoria prov., Yei, 1.vi.63, P. & P. Carter. Paratype ♀, same data.

Discussion.

The female of the new species is very like a small version of the females in *Pamacris diversipennis* Ramme. The division of the genera *Pamacris* and *Lobopoma,* mainly on tegminal facies, seems less justified than formerly.

Auloserpusia ochrobalia sp. nov.

Male.

Head dark olivaceous brown, except for two light buff areas below eyes on either side of head. Anterior part of vertex and upper part of frons dorsal to antennal sockets, also lighter brown. Eyes dark brown.

Antennae dark brown, blackish from segment 3-8. Apically lighter brown. Approximately 1 3/4 times length of head and pronotum as seen from above. Antennal sockets directed antero-laterally (fig. 28). Eyes in life dark brown.

Pronotum (figs. 19 and 23) moderately rugose, generally dark olivaceous brown with 8 faint ochrous markings. Posterior margin of pronotum incised medially. No median or lateral carinae. Anterior sulcus hardly developed dorsally. Sulci 2-4 entire, crossing dorsal surface of pronotum.

Tegmina reaching or just surpassing posterior edge of first abdominal segment. Uniformly coloured olivaceous brown.

Thorax and abdomen rather uniform olivaceous brown or brown. Posterior margins of abdominal segments 1-8 edged with black. Cerci brown, olivaceous apically.

Posterior femora and tibiae uniform brown. Outer side of femora slightly olivaceous. Nine inner and seven outer tibial spines. Spines and spurs light yellow brown with black tips.

Male genitalia (figs. 32, 36) with rather broad penis valves, closely appressed on median line. Not deeply excised apically as in *malasmanota* sp. n. nor elongate as in *charadrophila* sp. n. (figs. 34, 35 and 29).

Female.

Head above, in front and below level of genae brown. Area behind eyes dull green. Eyes brown. Antennae brown, in basal third blackish. Pronotum olivaceous green with entire border (except median dorsal anterior edge) crimson (figs. 12, 14).

Pronotum only moderately rugose, with second, third and fourth sulci complete across disc. Paired smoother areas lying laterally between first and second, and between second and third transverse sulcus, paler greenish yellow. Prosternal tubercle pointed and slightly anteriorly directed; yellowish. Rest of body brownish below. Thorax greenish above and at sides. Abdomen brownish, especially towards apex. Segments 1-5 conspicuously edged with black. Tegmina brown, their tips level with posterior edge of first abdominal segment.

Fore and mid legs greenish, with outer side of fore femora bearing bluish markings. Fore coxae reddish on outer side. Tarsi brown, tibial spines black. Posterior femora grey-green on outer dorso-lateral and inner dorso-lateral areas. Inner surface bluish green. Lower inner area slate blue. Outer lower area brownish grey. Whole femur shaded to brownish towards 'knee'. Lunules of 'knee' brown edged with black sulcus above. 'Herring-bone' pattern on outer side outlined in darker green. Posterior tibiae brown with row of hairs along inner ventral surface. Spines yellow, tipped with black; seven outer and eight inner spines. Of the outer row, most proximal one very small. Spurs duller yellow; black-tipped. Tarsi brownish.

Differential Diagnosis.

This species differs from all other described species in the colouring of both sexes and in the form of the male genitalia. The continuous crimson margin of the female pronotum should be noted, as well as the length of the male antennae which are intermediate between those of

potamites and *malasmanota* on the one hand, and *chopardi* and *charadrophila* on the other.

In Dirsh (1962) p. 83, a key to the species of the genus *Auloserpusia* is given. The male supra-anal plate is very similar to that of *picta* Ramme, *impennis* Rehn, *squamiptera* Ramme, *albifrons* Ramme and *olivacea* Ramme. In addition it resembles that of *potamites* sp. nov. and *chopardi* Dirsh. Unlike *sagonai* Ramme or *picta* Ramme the outer side of the male posterior femur bears no black markings, resembling *impennis, squamiptera, albifrons* and *olivacea* in being uniformly coloured. As far as its near relatives geographically are concerned, the male femoral colour is very near that of *malasmonota* sp. n. and *charadrophila* sp. n. here described. The distinct tympanum and tegmina surpassing posterior border of first abdominal segment (probably 'metanotum' in Dirsh (1962) p. 85, couplet 8, should read 'first abdominal segment' and 'end of mesonotum' in couplet 7 be changed to 'end of metanotum'). It is a larger species however than either *albifrons* or *olivacea*. Unfortunately Dirsh gives no diagrams of the male genitalia so that affinity cannot be drawn between these two Congo species and their West African relative.

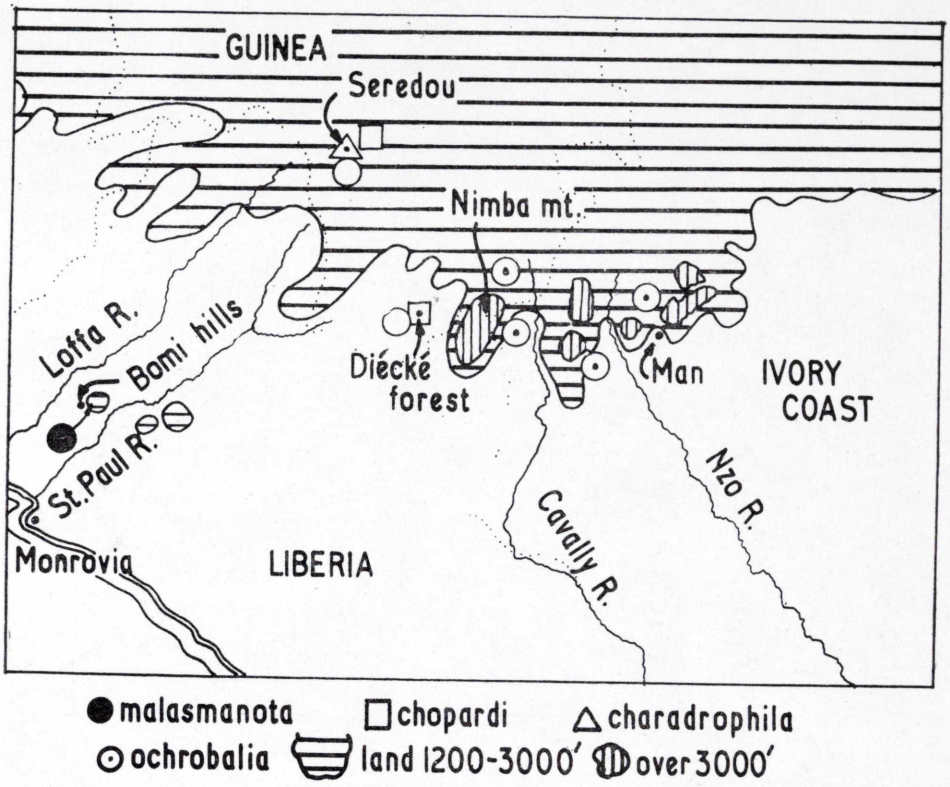
Measurements.

	Males	*Females*
Head width:	(8) 4·2- 4·6, mean 4·34	(10) 4·8- 6·0, mean 5·28
Length posterior femur:	(8) 11·4-13·0, mean 12·22	(10) 14·2-18·8, mean 17·10
Frons to tegminal apices:	(8) 9·0-10·8, mean 10·00	(10) 11·6-14·8, mean 13·16
Body length:	(8) 17·0-20:0, mean 18·65	(10) 23·4-29:4, mean 27·06

Material.

Holotype ♂, Côte D'Ivoire, Monts des Dans, 8 mls. N. of Man, 26.vii.63, N. D. Jago. *Paratypes* 6 ♀ ♀, same data as holotype; 3 ♂ ♂, Côte D'Ivoire, 10 mls. S. of Nzo, Nzo—Danane rd., 12.vii.63; 1 ♂, 3 ♀ ♀, Côte D'Ivoire, Man— Danane rd., 10 mls. W. of Zo R. bridge, 13.vii.63; 1 ♂, Guinea Republic, N. E. end of Nimba range, 4 mls. N. W. of Nzo, 24.vii.63; 1 ♂, 1 ♀, Guinea Republic, Col de Seredou,

arr. 2100 ft., W. of Irié, (14-16).vii.63; 1 ♂, 2 ♀♀ (immature), GUINEA REPUBLIC, Diécké forest, 20 mls. N. of Diécké, 24.vii.63. All material collected by N. D. Jago.



Map. 1.—Relative distribution of *Auloserpusia* species in the area of Nimba mountain.

Discussion.

Habitats varied from wet riverine forest to open areas within low semi-deciduous forest. At the Col de Seredou habitat the insects inhabited a rather open montane forest floor at 2100 ft. with lush herbs, sunshine penetrating the canopy from above. It is clear that the species is tolerant of the drier niches in moderately moist to moist forest habitats. The species probably extends across the entire mountain area from N. W. Ivory Coast to West Central Guinea. R. Roy from Dakar has recently collected in the mountains of N. E. Sierra Leone, and

reports no *Auloserpusia* species from there. It is possible that the species does not extend into the more isolated massifs west of Guinea (map. 1).

Auloserpusia potamites sp. nov.

Male.

Head and pronotum rugose and coarsely sculptured (figs. 18 and 22). Head bright green with large angular orange markings below compound eyes, extending from genae to frons and finishing anteriorly on a line with outer edge of antennal socket. Upper end of frons and anterior end of fastigium verticis yellowish or orange. Lower edge of clypeus and labrum broadly margined with black. Frons in profile distinctly concave (cf. *ochrobalia* sp. n.). Antennae very long, being twice length of head and pronotum as seen from a dorsal aspect (fig. 27); black with 3 basal segments greenish. Eyes in life brown.

Pronotum (fig. 22), with 4 pairs of orange yellow markings, two anterior pairs tending to fuse laterally. Dorsal side of pronotum with very irregular median carina, obliterate posteriorly and crossed by second, third and fourth transverse sulci. Metanotum with two almost square orange-yellow markings fusing in their anterior half. Sides of pronotum orange with epimera and episterna outlined in green and green-tipped ventrally. Prosternal tubercle yellow, pointed and slightly curved anteriorly.

Tips of tegmina almost reaching or level with posterior edge of first abdominal segment. Uniformly pigmented; green.

Abdomen with first segment bearing two angular orange markings which are fused medially. Rest of abdomen generally orange-brown with segment 9 onwards, including supra-anal and sub-genital plates, dark blue green. Each of segments 1-9 edged posteriorly with black. Cerci pointed, conical, yellow with narrow green line on inner surface. Body as a whole brownish below.

Fore and mid-legs with coxae yellow and proximal 3/4 of femora orange-yellow. Rest of femora and tibiae green. Proximal segments 1 and 2 of tarsi brown. Third segment greenish with pad, claws and apical part brownish. Posterior femora ochre to yellowish with distal third green. Green pigment also extending faintly along carinae on all sides. Lunule of 'knee' black. Lower apical femoral lobes on both sides bluish. Posterior tibiae blue proximally, mainly green but extreme

tip red. 8 outer and 9 inner tibial spines, yellow with black tips. Posterior tarsi and tibial spurs red, spurs red, spurs being black tipped.

Male genitalia (figs. 2 and 31) with broad almost parallel sided penis valves when viewed from above. Genitalia more thickly sclerotised apically than those of *chopardi* (cf. fig. 1).

Female.

General head, pronotal, thoracic and abdominal colour uniform bright green. Head and pronotum very rugose (figs. 11 and 13). Transverse sulci much as for male. Rugosities on head, pronotum, and thoracic pleura, yellowish. Antennae blackish. Basal segments greenish or yellowish. Prosternal tubercle yellow; shape like that of male. Fore and mid-legs green, with yellowish coxae and tips of tibiae plus tarsi reddish. Spines black. Tegmina green. Abdominal segments 1-5 edged with black; 6-8 edged with dark green. Valves of ovipositor bluish, tipped with yellow: cerci yellow. Posterior femora uniform green, except apically where lunules are black and there are yellow tips to femur and a yellow spot on either side in front of each 'knee' lunule. Posterior tibiae green with extreme proximal end yellow and extreme distal end red. 8 outer and 9 inner tibial spines, all yellow with black tips except innermost distal spine which is red. Tarsi and spurs red, latter being black-tipped.

Differential Diagnosis.

Nearest to and easily confused with *chopardi,* this species differs in many small external details, the male genitalia being however very different (cf. figs. 1, 2 and 31, 33).

The new species (see Measurements below) is a larger insect. The antennae (figs. 25 and 27) are proportionately much longer, and though in *chopardi* the antennae are also black, the basal segments tend to be bluish green rather than green as they are in *potamites.* In *chopardi* the median frontal ridge, clypeus and labrum are very dark blackish green or black, the frontal ridge being shiny. In *potamites* these parts are green, the clypeus and labrum also having yellow markings, while the frontal ridge is only slightly more polished than areas to either

side. In *chopardi* the orange-yellow body markings of the thorax and first abdominal segment are discrete. Further, the femora have distinctly bluish ventral apical lobes in *potamites,* while in *chopardi* they are dark green.

Measurements.

	Males	*Females*
Head width:	(9) 4·3- 4·6, mean 4·44	(4) 5·7- 5·8, mean 5·78
Length posterior femur:	(9) 13·6-14·3, mean 13·95	(4) 19·4-21·0, mean 20·07
Frons to tegminal apices:	(9) 10·1-11·7, mean 10·86	(4) 14·1-16·5, mean 15·12
Body length:	(9) 19·6-22·6, mean 20·96	(4) 29·0-33·9, mean 31·07

Holotype ♂, GHANA, E. Region, Atewa hills, N. of Akwatia, Pusa Pusa R., 21.vi.61, N. D. Jago. Paratypes 6 ♂♂ (2 nymphs), 3 ♀♀ (2 nymphs), same data as holotype; 1 ♂, 1 ♀, same locality, 20.iv.63; 3 ♂♂, 5 ♀♀ (1 nymph), same locality, 16.i.62; 4 ♂♂ 1♀ (nymph), same locality, 16.iii.62; 1 ♂, 1 ♀, GHANA, W. Region, 6 mls. W. of Tano R. ferry, Asankrangwa— Enchi road, 24.ix.62. All collected by N. D. Jago.

Discussion.

This species seems to be confined to forest areas east of the Bandama R. Since it has been collected in S. W. Ghana it is very likely that it extends into all parts of S. E. Ivory Coast where the forest is wet enough and the canopy open. Typically, it is locally very common in the Pusa Pusa ravine, a unique valley floristically, containing as it does a large number of tree ferns in an abundance found nowhere else in Ghana. The insect prefers living among ferns in very wet areas near running streams, and seems to feed on the ferns. The insects are invariably found sitting on the vegetation, not on the ground. The western region locality differs in being a small fern patch created by a large tree whose root system had been torn up when the tree fell. In this small clearing near a swamp, suitable forb growth had emerged, but the population of *potamites* seemed to be very small and extensive

searching revealed only one male and one female. Comparing the habitats of *potamites* with those of the other species described in this paper, it seems that they are the remnants of wet lowland and submontane forest conditions such as still survive in the mountains of Guinea. Such cool wet conditions were once probably more extensive. The Atewa hills are unusual in being an 'island' where the rainfall is as high as that of the rain forests of South West Ghana.

Chopardi, with which this species has been compared, seems to be confined to the west of the Bandama R. and is sympatric with *ochrobalia* and *charadrophila.* It is clearly recently separated from *potamites,* probably by the dry isolating central Ivory Coast savannah mosiac (Booth, 1958 a, 1958 b), which together with the north-south river systems tends to divide this area of West Africa into discrete forest blocks, the Sassandra, Liberia, Guinea block to the west and the S. W. Ivory Coast, Ghana block to the east. Chopard was the first to describe the species *chopardi* under the name *olivacea* (Chopard, 1958). His was female material from the Nimba area (Roy, 1960), and he placed his holotype in the genus *Macroserpusia.* Dirsh (1962) has recently corrected the synonymy of the genus *Auloserpusia* and as a result *olivacea* had to be renamed *chopardi* as the former was a homonym (Dirsh, 1963). The material worked on by Dirsh also included male specimens, which he described. Unfortunately *ochrobalia* males are also mixed with this series at the British Museum, leading Dr. Dirsh to the conclusion that *chopardi* occurred as pale coloured and brightly coloured polymorphs. Faded museum material does not do justice to the considerable colour differences between *ochrobalia* and *chopardi* when they are seen in the field, while the females are of course strikingly different.

Auloserpusia charadrophila sp. nov.

Male.

Head uniform light brown (figs. 15 and 16). Frons down to fronto-clypeal suture straight when viewed in profile. Head and pronotum rather smooth, being only lightly and rather uniformly pitted, rather than deeply sculptured. Antennae (fig. 24) about 1 1/2 times length of head and pronotum as seen from above. Antennae with apical 2/5 orange-brown, basal 3/5 blackish. Eyes in life dark blue-black.

Pronotum uniform brown with tinge of olivaceous posteriorly. Disc

of pronotum (fig. 20) crossed by transverse sulci 2-4. No median or lateral carinae of any kind, pronotum being saddle shaped. Paired smoother areas at ends of first transverse sulcus and behind third transverse sulcus (fig. 15), not raised on very pronounced callosities.

Tegmina olivaceous brown, their apices falling short of surpassing posterior edge of first abdominal segment. Rest of thorax brown with olivaceous lateral sides.

Whole of abdomen brown, segments 1-8 with tergites edged with black posteriorly. Cerci orange-brown with darker brown to olivaceous tips; smoothly conical.

Fore and mid-legs uniform light brown. Posterior femora uniform light brown, 'knees' being lighter orange-brown. Posterior tibiae greenish brown. Nine inner and seven outer tibial spines, all yellow with black tips as are tibial spurs. Posterior tarsi light brown.

Male genitalia (figs. 29 and 35) with erect, elongate penis valves, decurved at apex.

Female.

Brightly coloured. Antennae only a little longer than head and pronotum (as seen from above), black with apical 1/2 brown. Eyes blue-black. Head dark green, lighter in front with slight yellow speckling on genae. Below level of fronto-clypeal suture brownish. Pronotum (fig. 9) dark green with two yellow markings over area of lateral callosities. Lateral callosities however not very prominent. Margin of pronotum edged with crimson, not continuously but in broken fashion along antero-lateral margin and dorso-lateral posterior margin. Median dorsal edges of pronotum both in front and behind without crimson band. Tegmina reaching almost half-way across second abdominal segment; dull maroon in colour. Thorax dark green above, brownish below (as is whole of under surface of abdomen). Lower edge of epimera and episterna crimson. Abdomen dark green above with posterior edge of tergites 1-8 edged with black. Valves dull yellow brown. Cerci yellow. Fore and mid legs with crimson coxae, green femora and tibiae, and brown tarsi. Posterior femora green, lower outer area grey-green, lower inner are blue. 'Herring-bone' pattern coloured darker green. Inner area blue-green. 'Knee' brownish with two yellowish

annuli just anterior to it. Posterior tibiae green with apex brown. Seven outer and nine inner spines, yellow with black tips, as are tibial spurs. Tarsi brown.

Differential Diagnosis.

The female is unique in general colouration. The males are very similar to those of *malasmanota* but differ in having no lighter yellow markings on the head, in having black instead of darker brown margins to the tergites, and in having orange-brown rather than yellow cerci. The eyes of *malasmanota* are dark greenish brown in life, not dark blue-black. Unlike *ochrobalia* the pronotum bears no paired lighter markings in the male. The genitalia are unique.

Measurements.

	Males	*Females*
Head width	(6) 3·9- 4·1, mean 4·05	(7) 4·9- 5·2, mean 5·03
Length posterior femur	(6) 10·8-11·9, mean 11·35	(7) 15·6-16·2, mean 16·10
Frons to tegminal apices	(6) 8·9-10·1, mean 9·36	(7) 12·4-13·8, mean 12·98
Body length:	(6) 14·9-18·0, mean 16·88	(7) 24·3-27·2, mean 25·38

Material.

Holotype ♂, GUINEA REPUBLIC, Col de Seredou, arr. 2100 ft., W. of Irié, (14-16).vii.63, N. D. Jago. Paratypes 6 ♂♂, 7 ♀♀ (2 nymphs), same data and collector.

Discussion.

This species lives in the wettest most shaded parts of the montane tropical forest. Typically it inhabits forb vegetation growing alongside or in moving streams. It is clearly closely related to *malasmanota,* the genitalia however indicating a wide degree of divergence probably

due to isolation in the Central Guinea mountain massif. It is tempting to predict that more endemic and closely related species will be discovered in other isolated mountain areas in Central Guinea. The area in which the insect lives is 2100 ft. above sea level and is typified by clear swift moving streams with many groves of tree ferns — a similar combination of habitat facies to those enjoyed by *potamites* in Ghana.

Auloserpusia malasmanota sp. nov.

Male.

Head uniform olivaceous brown with olivaceous area immediately behind compound eyes, and pale yellow area below each compound eye extending from level of back edge of antennal socket in front, to 2/3 of way across gena posteriorly. Vertex lighter brown, labrum dark brown apically. Antennae about 1 3/4 times length of head and pronotum as seen from above (fig. 26); greenish basally with rest brown shading to light brown distally. Eyes in life dark greenish brown. In profile frons almost straight (fig. 17).

Pronotum (fig. 17) moderately smooth with no trace of lateral or median carinae. Disc crossed by all four transverse sulci (fig. 21) though first sulcus very weak dorsally. Smooth paired callosities dorsolaterally olivaceous and hardly inflated.

Tegmina uniform light brown to slightly olivaceous apically. Apices not reaching to posterior edge of first abdominal segment.

Rest of thorax and abdomen uniform brown, sides of thorax olivaceous (epimeron and episternum of third thoracic segment often blackish), and each of abdominal tergites 1-8 edged posteriorly with black. Cerci smoothly pointed, yellow.

Fore and mid-legs light brown except for tibiae which are olivaceous. Tarsi yellowish. Posterior femora uniformly light brown, slight olivaceous above. Posterior tibiae light brown with 7 outer and 9 inner spines all yellow with black tips (as are tibial spurs). Posterior tarsi rather more orange-brown.

Genitalia with penis valves oppressed medially (fig. 30) and tapering when viewed from above. Orientated as in fig. 34.

Female.

Female very distinctive with broad black diagonal bands on either side of pronotum and a fainter pair of black spots above in anterior median 3/5 (fig. 10). Head rather smooth, above line of fronto-clypeal suture green with faint brownish markings, more especially along each side of vertex. Clypeus, labrum and mandibles brownish. Antennae much longer than head and pronotum when viewed from above, basally dark brown to blackish, shading to light brown in apical half.

Pronotum rather smooth with paired smooth dorso-lateral callosities moderately inflated (fig. 14), profile anterior to 4th transverse sulcus being markedly convex. Lateral front edge of pronotum yellow, as is prosternal tubercle. Except for black areas (which give name to this species), rest of pronotum green, pigment being paler in area of dorso-lateral callosities. Lateral black stripes extended on to prothoracic episterna. Rest of thorax green above and at sides, but brownish below.

Tegmina red-brown; apices extending just over half-way across first abdominal tergite, not covering tympanum.

Abdomen mostly dark olivaceous green with posterior edge of tergite 8 bordered with ochre dorso-laterally, black laterally and light brown above. Second abdominal tergite blackish brown, blackening laterally. Ovipositor valves brown, cerci yellow.

Fore and mid legs green, tarsi brownish. Posterior femora green with 'herringbone' pattern of inner and outer surfaces lined in black. Inner femoral area blackish. Lower inner area blue-grey, lower outer area dark olivaceous brown. 'Knee' brownish with brown lunule outlined above with ochrous stripe. Posterior tibiae olivaceous brown with 8 outer and 9 inner spines, all yellow with black tips (as are tibial spurs). Posterior tarsi brown.

Differential Diagnosis.

The female is very distinctive, differing from all other described species in the form and colour of the pronotum. The antennae are relatively much longer than in *charadrophila,* the nearest relative. Males have unique genitalia and, while in a general way very similar to males of *charadrophila,* differ in pigmentation of face, cerci, and eyes, large overall size, and longer antennae.

Measurements.

	Males	*Females*
Head width:	(13) 4·2- 5·9, mean 4·54	(5) 5·4- 5·8, mean 5·60
Length posterior femur	(13) 12·2-14·6, mean 12·84	(5) 16·0-18·4, mean 17·56
Frons to tegminal apices:	(13) 9·6-12·8, mean 10·50	(5) 13·4-15·1, mean 14·34
Body length	(13) 18·4-21·2, mean 19·72	(5) 26·0-31·3, mean 29·52

Material.

Holotype ♂, LIBERIA, N. of Monrovia, Bomi hills, 5 mls. N. E. of mines area, nr. forest reserve rest house, 23.vii.63, N. D. Jago. Paratypes 13 ♂♂ (1 nymph), 5 ♀♀ (1 nymph), same data and collector.

Discussion.

All material was collected in a low evergreen forest containing natural and artificial clearings, not far from a fast flowing river. The species was invariably found sitting on saplings. Ferns were not in evidence as a dominant part of the vegetation, indicating a rather drier type of habitat than that prefered by either *potamites* or *charadrophila*.

* * *

All types have been deposited with the collections of the British Museum (Natural History), London. All paratype material is retained in the department of Zoology, University of Ghana, Legon, Accra. Measurements are presented in the same way as those in Jago (1963). All measurements are in millimetres.

I wish to acknowledge the stalwart assistance of my friend Mr. G. L. Mabey on our combined venture to Guinea and Liberia.

SUMMARY.

Five new grasshopper species are described. Four of these belong to the genus *Auloserpusia,* one of them having been confused in the past with the recently described *Auloserpusia chopardi* Dirsh, 1963. Each

species is associated with a particular mountain or hill complex in Ghana, Ivory Coast, Guinea or Liberia. Lastly a new species belonging to the genus *Lobopoma* is described, the type specimens being part of a very useful collection made for me by Mr. and Mrs. Pat Carter on a recent overland excursion from Accra to the Ruwenzori via Chad.

Bibliography.

Booth, A. H.

1958 a. The zoogeography of West African Primates: A review *Bull. I. F. A. N. A.*, **20** (2): 588-622, 21 figs., tables.

1958 b. The Niger, the Volta, and the Dahomey gap as geographical barriers. *Evolution*, **12** (1), 48-62, 4 figs., tables.

Chapman, R. F.

1961. Some new and little kown Acridoidea (Orthoptera) from West Africa. *Ent. mon. Mag.*, **116**, 240-242, 9 figs. (paper dated 1960, published 1961).

1962. The ecology and distribution of grasshoppers in Ghana. *Proc. Zool. Soc. Lond.*, **139** (1), 1-66, 20 tables, 55 figs.

Chopard, L.

1958. La réserve naturelle intégrale du Mont Nimba. III Acridiens. *Mém. Inst. Fr. Afr. Noire*, **53**, 127-153, 7 figs.

Dirsh, V. M.

1962. Synonymic notes on African *Acridoidea* (Orthoptera). *Rev. Zool. Bot. Afr.*, **65**, (1-2), 81-89, 3 figs.

1963. La réserve naturelle intégrale du Mont Nimba. VI Orthoptera, Acridoidea (second contribution). *Mém. Inst. Fr. Afr. Noire*, **66**, 207-220.

Jago, N. D.

1962. New species and new records of Acrididae (Orthoptera) from West Africa. *Proc. R. ent. Soc. Lond.*, **31** (11-12), 137-150, 37 figs.

1963. A revision of the genus *Calliptamus* Serville (Opthoptera, Acrididae). *Bull. Brit. Mus. (Nat. Hist.) Ent.*, **13** (9), 287-350, 26 figs., 1 table.

Karsch, F.

1896. Neue Orthopteren aus dem tropischen Afrika. *Stettin. ent. Ztg.*, **57**, 242-359, 38 figs.

Ramme, W.

1929. Afrikanische Acrididae, Revisionen und Beschreibungen wenig bekannter und neuer Gattungen und Arten. *Mitt. Zool. Mus. Berl.*, **15**, 247-492, 16 pls., 106 figs.

Roy, R.

1960. Importance écologique des Orthoptères dans l'Ouest africain. *Bull. I. F. A. N.*, A., **22** (1), 198-206, 3 figs.